Biomineralogy of cancer.

Maciej Pawlikowski*

*/ AGH- Univ. Science and Technology, Cracow, Poland.
e-mail: mpawlik@agh.edu.pl

Biomineralogical investigations of cancer in various tissuesbreast, connective tissue, skin, lungs, thyroid, pancreas, bone, cartilage, etc. have been conducted in our Laboratory with the use of mineralogical methods (SEM-EDS, EMP, IR, X-RD, ASA, etc.) for the last 40 years. Obtained results allowed us to discover elevated levels of various elements at tumor sites of mentioned cancers.

Studies regarding calcification general tissue and organ biomineralization (Pawlikowski) carried out in parallel to cancer research indicate a relation between the body's overall calcification and age. They also prove that a significant portion of the elements lost from bones in the process of osteoporosis (mainly P and Ca, but not only those), are not excreted from the organism but can crystallize in the crystallization centers found in various tissues of the body (Pawlikowski 1987, 1991 b, c, 1993a, 1995a, 1999, 2003b, 2011, 2013, 2016 a, b, 2017 a, b, c,).

Such tissue mineralization is perceived as a two-stage phenomenon.

The first stage is hidden mineralization, which does not manifest by any changes that can be captured macro- or microscopically. Tissues look "normal", but their chemical analyzes carried out with sensitive methods indicate increased levels of some elements. This means that said elements get deposited in the tissues -- specifically in their atomic structures. It is believed that the elements can be deposited in spots of tissue destruction (destruction of atomic structure) where there are free bonds (crystallization centers capture migrating ions that have electric potential). The tissues mineralized in this way have physicochemical properties that are only slightly different from "healthy" (normal) tissues; nevertheless, e.g. joint cartilage affected by such mineralization is harder, less slippery, fragile and less flexible than healthy cartilage.

The second stage of biomineralization of tissues is the evolution of hidden mineralization into overt mineralization, which is observed as mineral concentrations, often so-called calcifications (in the arteries - arteriosclerotic plaque).

Mineralization may remain at the first stage of development or evolve into the second stage.

In the case of hidden mineralization, the moment of cell division is particularly sensitive, regardless of the tissue in which this cell is found. For when the division takes place in the "environment" where the amounts of elements and compounds are too small or too large (including external compounds -- so-called carcinogens), a defect may occur in the structure of the DNA section that is responsible for cell multiplication.

Such defect may occur in various tissues (cells), at various places in this section of DNA, and may be caused by various elements and compounds. The result is a variety of cancer types. The cell that has been deformed like that usually multiplies at a faster than normal rate, resulting in the formation of a huge number of cells observed as cancerous lesions (e.g. tumors).

Taking into account all of the above, it can be assumed that there is a connection between age, transfer of elements (mainly Ca and P) from bones to body fluids and tissues (osteoporosis), and incidence of neoplastic diseases (Pawlikowski, Niedźwiedzki 2002).

This picture is additionally complicated by carcinogenic external factors, which overlap with the natural process of biomineralization (calcification) of tissues associated with the transfer of elements from bones to soft tissues.

This process, i.e. bone demineralization (osteoporosis) associated with age and other factors, causes transfer of those elements to various tissues and, in effect, their "calcification", which contributes to the formation of neoplastic changes (Pawlikowski, Pfitzner 1999a, Pawlikowski 2013, 2014, 2016). Therefore, in view of the described phenomenon, it seems unfavorable to recommend a dairy-rich diet at an older age. It supports additional mineralization of body fluids and by superimposing on the "osteoporotic" mineralization, it accelerates the described biomineralization processes.

Therefore, demineralization of bones (osteoporosis) leads not only to "weakness" of said bones, but is a process of self-destruction of the body, which develops at different rates in different people. This is related to many factors – genetic, environmental, etc.

Investigating and fully understanding the processes described here may be the basis for fighting them and eliminating their deadly consequences. Biomineralogical research conducted in this area, as well as in many other fields, gives a hint of hope for positive results in the fight for health and life.

Literature:

Pawlikowski M., Mineralizacja organizmu człowieka żyjącego. (Mineralization of human living organism). Prace Mineral. (1987) 79: 121.

Pawlikowski M., Mineralizacja pęcherzyka żółciowego (Mineralization of gallblader). W: Biomineralizacja i biomateriały. PWN, Warszawa (1991b),: 84-92.

Pawlikowski M., Mineralizacja nowotworowa (Cancer mineralization). W: Biomineralizacja i biomateriały. PWN, Warszawa (1991c): 84-92.

Pawlikowski M., Kryształy w organizmie człowieka. (Crystals of human organism). Secesja. (Atlas) (1993a):132.

Pawlikowski M., Sekrety mineralizacji tkanek (Secret of tissue mineralization). PAN, Kraków (1995a) :97 p.

Pawlikowski M., Swiderski K., 1996 Badania mineralogiczne relacji wiek-demineralizacja kości-mineralizacja tętnic. Materiały II Zjazdu Pol. Tow. Angiologicznego, str. 14.

Pawlikowski M., Swiderski K., 1996 Badania mineralogiczne vasa vasorum aort brzusznych. Materiały II Zjazdu Pol. Tow. Angiologicznego. str. 30.

Pawlikowski M. Preliminary results of dissolution of substances mineralizing human arteries. Arch. Mineralog (1999) 52: 195-210.

Pawlikowski M., Pfitzner R., Mineralizacja serca i dużych naczyń. (Mineralization of heart and big blood vessels). Wyd. IGSMiE PAN Kraków (1999a): 142 p.

Pawlikowski M., Niedźwiedzki T., Mineralogia kości. (Mineralogy of bones). Wyd. PAN Oddział w Krakowie (2002): 128.

Pawlikowski M., Minerals in human blood vessels and their dissolution in vitro. In: Skinner HCW, Berger AW, Geology and health. N.Y. – Oxford. Oxford University Press (2003b) pp.155-158.

Pawlikowski M., Biomineralization of cancer tissues. 20th Int. Symp. Molecular and Physiological Aspects of Regulatory Processes of the Organism. Cracow. Ed. H. Lach. Wyd. Abaton. Kraków (2011): 190-191.

Pawlikowski M., Mineralizacja guzów nowotworowych płuc. (Mineralization of lung cancer tumors). Auxiliary sciences in archaeology, preservation of relicts and environmental engineering (2013) CD -no 15, Ed. M. Pawlikowski.

Pawlikowski M., Osteoporosis as a source of tissue mineralization. Research on osteoporosis therapy and dissolution of arterial mineralization. Jour Life Science 8 (2014b): 610-625.

Pawlikowski M., Biomineralogy of osteoporosis. Academia Journal of Biotechnology 4 (2016): 138-144.

Pawlikowski M., Biomineralogical investigation of apatite piezoelectricity. Traumatologia i ortopedia Rosiji (2016a) – 2 (80): 58-63.

Pawlikowski M., Electric phenomenon in bones as a result of piezoelectricity of hydroxyapatite (2016b) Arch. Clin. Biomed. Res. 2017; 1 (3): 132-139

Pawlikowski M., Biomineralogy of angiogenesis. Arch. Clin. Biomed. Res. (2017a); 1 (4): 161-167

Pawlikowski M., Miler M., Biomineralogy of selected skin cancer. SM Dermatolog J. (2017b); 3(3): 101.

Pawlikowski M., Centers of Human Tissue Biomineralization (Calcification). Cardiol Cardiovascmed (2017c); 1 (6): 252-261.